DOCUMENT RESUME

ED 466 613 IR 021 348

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TITLE	We're Not Designing Courses Anymore.
PUB DATE	2001-00-00
NOTE	7p.; In WebNet 2001: World Conference on the WWW and Internet Proceedings (Orlando, FL, October 23-27, 2001); see IR 021 310.
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Computer Uses in Education; *Distance Education; Educational Technology; Educational Trends; Higher Education; *Instructional Design; *Learning Modules; Standards
IDENTIFIERS	Instructional Design Professionals; Learner Centered Instruction

ABSTRACT

Developing standards for e-learning will have important implications for instructional designers. The most obvious change is that designers will not be designing courses any more; they will be designing small, stand-alone units of instruction called learning objects. This will create a learning object economy that will bring new challenges as well as open new opportunities for designers. This trend will affect the instructional design process in several ways: (1) design of instruction will focus on the creation of small, stand-alone, modular units, rather than courses; (2) units will be designed for multiple contexts of instruction, rather than for specific training requirements; (3) instructional content will be separated from display format, for easy customization of content; (4) instructional content will be standardized to be interoperable with other learning management systems; and (5) instructional units will be tagged and held in a repository so that they can be managed, searched, and easily updated. Instructional designers will have to change their design philosophy if they are to remain competitive and profit in the e-learning market. (Contains 17 references.) (Author/MES)

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We're Not Designing Courses Anymore

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Abstract: Developing standards for e-learning will have important implications for instructional designers. The most obvious change is that designers will not be designing courses anymore. They will be designing small, stand-alone units of instruction called learning objects. This will create a learning object economy that will bring new challenges as well as open new opportunities for designers. This trend will affect the instructional design process in several ways: 1) Design of instruction will focus on the creation of small, stand-alone, modular units, rather than courses; 2) Units will be designed for multiple contexts of instruction, rather than for specific training requirements; 3) Instructional content will be separated from display format, for easy customization of content; 4) Instructional content will be standardized to be interoperable with other learning management systems; and, 5) Instructional units will be tagged and held in a repository so that they can be managed, searched, and easily updated. Instructional designers will have to change their design philosophy if they are to remain competitive and profit in the e-learning market.

Introduction

Instructional designers in today's *e-learning* market are being asked to design small units of stand-alone instruction, called learning objects, that can be tagged and managed in a repository and assembled into learning modules or courses as needed (Centre for Learning Technologies, 2000). While the driving force behind this movement is concern for cost, there are implications for instructional design that may not be so obvious. Whether learning objects are built using digitized photographs, animations, text, or any other content, buyers can save money by reusing these learning objects in different instructional contexts. Sellers can profit by selling instruction over and over again to different customers. More importantly, learners will profit because instruction can be more easily tailored to their needs.

The use of learning objects in the design of instruction supports the new view that instruction should be *learner-centric*. In the near future, students will be educated and employees trained through individualized, self-paced instruction that is available anytime, anywhere, and is specific to their particular training needs. Because of the specificity of requirements, this "just-in-time" training will also be "just-enough" training that is not as lengthy as a full course and addresses the immediate training need. Building these small units of instruction will require more specific design guidance than has been available to the instructional designer in the past.

Various organizations involved in creating standards, such as the Institute of Electrical and Electronics Engineers (IEEE), are promoting architectural standards for instructional content. When these standards are implemented throughout the e-learning industry, the desire is that instructional content should run seamlessly in any learning management system (LMS). Eventually, all content, whether it is a learning object or the media associated with a learning object, will have standard descriptions or tags associated with it that will make it discoverable when it is stored in a repository. The Department of Defense (DoD) is leading the way in the development of the Shareable Content Object Reference Model (SCORM) that provides standards for instructional content, LMS interfaces, and metadata (http://www.adlnet.org).

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The developing standards for instructional content will have important implications for instructional designers. The most obvious change in the design approach is that designers will not be designing courses anymore. The job of instructional designers will change in several ways: 1) Design of instruction will focus on the creation of small, stand-alone, modular units, rather than courses; 2) Units will be designed for multiple contexts of instruction, rather than for specific training requirements; 3) Instructional content will be separated from its visual display format to support multiple displays of the same content; 4) Instructional content will be standardized to be interoperable with other LMSs; and, 5) Instructional content will be tagged and held in a repository so that it can be managed, searched, and easily updated.

Design Small Modular Units that Stand-Alone

Instructional designers in today's e-learning market are being asked to design small pieces of reusable instructional content. Instead of being called course designers they will soon be called content designers, and the pieces of content they are creating are called learning objects. Sometimes the requirement will be to link several learning objects together to make a course. In other cases, it will be to create a single, small unit of instruction that will be used in a performance support context. Academic institutions and corporate training divisions are both producing this new kind of instructional material. For example, Hurlburt (2001), in an introductory statistics course, created learning objects that he called "lectlets." A lectlet was a short Web streamed audio lecture synchronized to an interactive text-graphics display. There were two to four lectlets for each chapter of the class textbook. The lectlets were accessible at any time, in any order, and were repeatable. The first 3 or 4 pages of each lectlet presented an interactive review of the previous lectlet, increasing the chance that the lectlet could stand-alone.

In order to distinguish learning objects from other content objects such as graphics or text, it is helpful to think of a learning object as a unit of stand-alone instruction. The content of a learning object should be similar in scope and nature to the content of a typical "lesson" so as to create instruction, not merely information (Downes, 2000), and it should be based upon a single learning objective (Longmire, 2000). Some learning objects will become "assignable units" in an LMS. This is the smallest segment of instruction that a learner can directly access and for which the LMS can track learner performance. Commercial best practices offer several suggestions to increase the probability and profitability of reuse of learning objects. According to Cisco Systems' strategy, a reusable learning object (RLO) should focus on a single job task and should be similar to a short lesson (Barritt, Lewis, & Weiseler, 1999). Learning objects should be independent of other content so that they can be recombined for different contexts. This means that each learning object must be able to stand alone so that confusion is not caused by references to previous topics (Centre for Learning Technologies, 2000; Quinn & Hobbs, 2000).

One practical way to design learning objects is to use formats or templates. For example, Cisco Systems requires that their learning objects contain content, practice, and assessment items. Cisco's specification also provides several standard formats for teaching various types of learning objects. Cisco's objects vary according to the type of knowledge being taught and the objective of the instruction (Barritt, Lewis, & Weiseler, 1999). Educational psychology textbooks (e.g., Crowl, Kaminsky, & Podell, 1997) often describe distinct forms of human learning, and stress the importance of tailoring instructional strategy to the individual learning needs. Standard formats have been proposed as a way to ensure uniform design quality (Merrill, 1997). More recently, Molenda (2000) has provided a model of twelve types of learning and corresponding instructional strategies and online delivery methods that could serve as the basis for a richer set of design templates.

Templates also offer a simple way to uniformly define the models of instruction used to construct stand-alone objects so that they can be utilized properly in a stand-alone mode or in the context of a larger instructional unit. For example, a commonly accepted format or template for teaching procedures would be to: 1) Present an overview of the entire procedure; 2) Demonstrate each step and identify its critical elements; 3) Coach the trainees as they practice each step; 4) Require the trainees to demonstrate the mastery of each step; 5) Integrate all steps; and, 6) Provide systematic practice toward fluent application (Thiagarajan, 1993). This procedural learning template is based upon sound, research-based learning principles, and more templates are appearing as research and practice progress. So, the use of standard templates can facilitate the creation of high quality

learning objects with understandable pedagogical strategy, making it more likely that they will be accepted and used by a majority of users.

Design Learning Objects for Multiple Contexts of Instruction

Just a few years ago, instructional designers were hired to design and develop stand-alone courses. These courses were designed so that a student could progress through several units of instruction designed for a specific context. Whether the units of instruction were called blocks, modules, lessons, or some other name, the units typically followed a linear sequence set forth by the instructional designer as the best way to impart the needed knowledge. The sequences were chronological, whole-to-part, step-by-step, or something else, but the *sequence* was part of the context that drew the units together to form a cohesive course. In order for the units to be truly sequential, they had to contain characteristics that allowed for an orderly transition from one unit to the next unit. All of this was known and practiced by good instructional designers who followed the golden rules of Instructional Systems Design (ISD). ISD is a linear and integrated process approach based upon the waterfall method of software development. ISD mandates that designers know their target audience, write and sequence performance objectives, and then design the sequence of instruction, in that order. While the ISD approach seemed adequate for the days of computer-based training, it has fostered a design strategy that is inadequate for a new distributed e-learning market that rewards reuse and repurposing of content.

From the perspective of the software engineers who are designing the standards for e-learning, it makes no difference whether a sequence of content objects is called a "course" or has a context when the content objects are chained together. But, current design practices are unduly influenced by ISD concerns about context and integration. Designing for linear sequencing and embedding context will limit the reuse of the instructional object. So, instructional designers will need to change their views on instructional design. In the real world, not all courses have an orderly and integrated sequence of instruction, or are embedded in a context. For example, in colleges and universities, there are many so-called "survey" courses in which each unit covers a topical area, but the topics are barely connected. Knowing material in the earlier units is not a prerequisite for learning the later units. A General Psychology course is a good example of such a course. A chapter on learning may contain some references to an earlier chapter on perception, but the connection is often minimal, and it is usually up to the individual instructor to provide context and determine the order and selection of chapters to be taught.

On the other hand, educational research has shown the importance of providing context to increase learning. It has been argued that meaningful learning will increase if it is embedded in the context in which it will be used (Oliver & Herrington, 2000). Situated learning environments provide context by reflecting ways in which learning outcomes are used in real-life settings. To illustrate, if emergency medical technicians are required to learn the parts of the brain, putting the required instruction in the context of an emergency situation involving a person with a head injury should facilitate learning. If context is important for learning but context limits reuse of content, then designer must consider both factors.

So, how can instructional designers provide instructional content that can be embedded in multiple contexts? Longmire (2000) suggests that the instructional designer should orient an object to its original or most likely context, but should also provide cues for learners to apply their own meanings and contexts to the information. Adding links to the learning object that point to various outside contexts is one way to do this. This way, developers may spend very little time changing the object and the learner can choose from several context options (Longmire, 2000). Longmire (2000) also suggests that it may be possible some day for an LMS to generate multiple software "wrappers," so that when a learner accesses a learning object, the context that appears will be tailored. Possibly, tailoring will be related to learner attributes. When it is possible to tailor the contextual framing of objects, the context frames must be divorced from the object (Longmire, 2000).

Separate Instructional Content from the Display Format

On the Web, content and display format appear inseparable, but in reality they may be coded separately. Various software programs provide options to change display characteristics, leaving content unchanged. The programs are similar to the software behind the "desktop theme" option in Windows that give users the

capability to change their desktop wallpaper, screen saver, fonts, and icons without changing any of the functions of the operating system. Graphical "skins" are software programs for Web applications that produce overlays that change the look of the browser. A skin does not change the way the browser application performs, only the way it looks on the computer monitor. For instance, a skin might allow users to get rid of the plain-looking gray area behind the tool bar and substitute a colorful background.

In the elearning market, instructional content must be carefully distinguished from the dsplay format. Learning object content, if it is to be reusable with minimum redesign, should allow for easy change of display format for a new instructional use. Most instructional designers who have used authoring tools for computer-based training know how easy it is to display content in various ways through the use of screen templates. The content is written with default values for fonts, font sizes, and backgrounds, but is displayed differently depending on the template that is chosen. When creating instructional content that will be Web-based, there are several ways to separate the display of the content from the content itself. One way is to use cascading style sheets (CSS), and another is to use XML Stylesheet Language (XSL). By separating the data from the presentation style, XSL and CSS provide flexible models for delivery of content in which different styles can be applied on the same data for different contexts or needs. Content structured by XSL has a self-describing quality, allowing it to be recognized by any XML-enabled LMS, regardless of the authoring environment in which it originated (Singh, 2000). The drawbacks are that XSL requires an XML-enabled LMS, and CSS requires browser support. But, the future of CSS and XML seems brighter than ever and the technologies are worth exploring.

Standardize Instructional Content to be Interoperable

Interoperability is a key component of the new e-learning environment. Sellers would have a much bigger market if their instructional content could be used by many different organizations that have many different learning environments. There are literally hundreds of very different instructional management systems and instructional authoring tools available to the developer. The obstacles to interoperability are enormous, and the ultimate solution must consider factors that deal with the learning servers, learning content and their integration. In order to make sense of this instructional chaos, EDUCAUSE established the Instructional Management Systems (IMS) Project, now called the IMS Global Learning Consortium. IMS has been working with many partners, including the DoD, to make their vision of interoperability a reality. The new SCORM reference model will rely heavily upon the developing IMS course packaging specifications. Only after the e-learning industry widely adopts some open standard will true interoperability become a reality.

Instructional Units Must be Tagged and Held in a Repository

If instructional content is to be reused widely, then the content itself must be discoverable and accessible to others. The content itself, or information about how to access the content, must reside in known repositories. In the real world, it is impractical for all instructional content or even information about content to be located in one repository. More likely than not, content and its information will be kept in a variety of locations, some of which can be freely accessed, and some of which will be for sale. New tasks for instructional designers will include going to several different repositories to find reusable learning objects and writing descriptions of learning objects they have created in the form of metadata files.

Metadata is the key to timely and meaningful discovery of existing content in a content repository. Metadata is simply a formatted file containing text that provides descriptive information about content. This information may include the format, size, delivery requirements, authorship, ownership, version number, instructional role, instructional characteristics, and type of interactivity. Sometimes an industry group will agree upon a format and a set of metadata descriptors or elements that capture the main ideas or essence of the most important characteristics of the content in a coherent and unitary fashion (Longmire, 2000). This is usually called the "core metadata" for that industry and there are numerous industry metadata standards (Quinn & Hobbs, 2000).

Metadata will be more useful if the designer uses a standard metadata schemes for tagging learning objects (Quinn & Hobbs, 2000). Each organization will have to adopt a metadata scheme and tagging rules that are appropriate for the kinds of information that it uses. For example, the DoD is in the process of developing or

adopting a standard metadata scheme for sharable content that can be used across many organizations and institutions (Quinn & Hobbs, 2000). DoD is incorporating the best practices from open standards organizations such as the IMS Global Learning Consortium (2000) and the Dublin Core (1999) to create its own set of mandatory and optional metadata elements. The Dublin Core working group has 13 super categories that make up their metadata scheme: Creator, Subject, Description, Publisher, Contributor, Date, Format, Identifier, Source, Language, Relations, Coverage, and Rights. Together, the IMS and Dublin Core sets of learning object metadata represent a set of elements that are considered fundamental by the broader learning community for describing learning resources (IMS Global Learning Consortium, 2000).

While there is little research available on metadata, there are current best practices for the development and use of metadata. For learning objects to be used intelligently, they must be labeled as to what they contain, what they teach, and what requirements exist for using them. Metadata tags often can be easily authored using a standard online form appropriate to the type of data being. Tags have a syntax that indicates the name of the field or domain of the tag, and the value attached to that label described (Downes, 2000; IMS Global Learning Consortium, 2000; Quinn & Hobbs, 2000. A word of warning--metadata should cautiously be applied to training areas that are constantly evolving since the time required to build metadata files may render them obsolete before they come on line (Schatz, 2000).

Summary

There is a new movement in e-learning for reusable instructional components. These developing standards will have important implications for instructional designers. The most obvious change is that designers will not be designing courses anymore. They will be designing small, stand-alone units of instruction called learning objects. This change will create a profitable learning object economy that will bring new challenges as well as open new opportunities for instructional designers. But, instructional designers will have to change their design philosophy if they are to remain competitive and profit in the e-learning market.

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Acknowledgements

The authors want to thank Don Johnson, Director of the Department of Defense Advanced Distributed Learning Initiative, and Janet Weisenford, Director of the Joint Advanced Distributed Learning Co-Laboratory for their support of this work.

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